# ARAB STEEL – 2000 AD

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## SUMMARY

Technological advances taking place in developed countries provide the means to the narrowing down of the techno-economic gap between them and the developing countries. Their efforts to stimulate rapid economic growth will inevitably call for large inputs of steel. Investments in new iron and steel plants impose a heavy burden on developing countries and they have come to rely, therefore, on foreign assistance, both for finance as well as technology. However, finance constitutes only one of a host of problems confronting steel development, and developing countries should give adequate thought to these vital techno-economic issues such as choice of technology, plant size and economies of scale, long-term planning, productivity and costs, etc while planning steel development.

The observations made on problems of steel development are mainly based on Indian experience. While these may hold good for those countries of Latin America, Asia and the Middle East which have a similar industrial base, the action points have to be suitably modified to suit the varying conditions obtaining in other countries.

### Foreign capital requirements

Though the external capital requirements of developing countries have been rising, there has been no appreciable change in the net inflow of capital and indications are of its likely reduction in the coming years. The developmental needs of these countries demand that the net inflow be maintained at least at the present level.

The adverse terms of aid and increasing balance of payment difficulties of most developing countries emphasize the need for drastic improvements in the pattern and terms of aid. The terms vary according to the lending agency and often from loan to loan, with interest ranging from 0.8 per cent to 6.5 per cent for 3 to 50 year terms with grace periods of 2 to 10 years (DAC, IBRD, IDA, etc). The loans granted by socialist countries usually bear an interest of 2.5 per cent for a term of 12 years with a 4 year grace period. The over-all aid picture is not satisfactory. Debt service charges are mounting and accounted for 45 per cent of gross official bilateral lending in 1966. There is a strong case for softening the terms of aid and for wider use of interest-free loans.

Finances for steel development

It is estimated that an integrated steel plant of say one million tons annual capacity would require about $ 300 million, with an import content ranging from 20 per cent in the case of a country like India to 70 per cent or more in the case of less developed countries. A number of plants have been built or are under construction in developing countries with the assistance of developed countries such as USSR, USA, UK, Germany, other European countries and Japan. The total investment required by developing countries during 1965-70 for their steel programmes so far announced, would be an estimated $ 7200 million, with a foreign exchange component of about $ 4500 million.

Owing to the huge invests involved, steel projects are often jointly financed by the government of the receiving country and loans and grants from international agencies and foreign governments.

Foreign aid and collaboration - its implications

A wide variety of arrangements is possible, and upon the choice of arrangement will depend the effectiveness of aid from the point of view of the developing country. No one questions the usefulness of foreign aid and collaboration, when judiciously employed. What is objectionable is the restrictive aspects of collaboration agreements which hamper technological progress and interfere in the domestic policies of recipient countries. The tendency of developing countries to accept eagerly any offer of collaboration has also led to over-import of capital in some sectors, while starving others.

Some of the unsatisfactory features of foreign aid were revealed in recent case studies of foreign collaboration in India, such as high cost of imported equipment, obsolete know-how and outmoded plant, insistence on foreign control of design and engineering even where local expertise is available, etc. The study also brought to light instances of over-import of capital and know-how, restrictive provisions, extra-territoriality, etc. By and large, Latin American experience and that of some other developing countries in Asia and Africa appear to have been similar.

Foreign loans have to be repaid sooner or later. The external debt outstandings of developing countries have risen from $ 10 billion in 1956 to $ 39.2 billion in 1965. Interest and amortization payments too have advanced from $ 0.8 billion to $ 3.6 billion during the same period. Their burden has increasingly fallen on export earnings. The over-all ratio of debt service payments to export earnings has more than doubled in the last decade and may absorb an estimated 18 to 23 per cent of the export earnings of developing countries by 1975.

Criteria for foreign collaboration

Foreign collaboration agreements should therefore be entered into where absolutely necessary, based on well-defined principles, namely: i) purchase of technology on a highly selective basis, utilising indigenous skills to the maximum; ii) procurement of know-how from the best and most economic source, instead of being saddled with obsolete or 'mixed bag' of technology; iii) management and control of project; and iv) channelling of 'purchased' technology through a competent local technical agency and making it available to other entrepreneurs to obviate proliferation and re-purchases of the same know-how.

Costs of 'tied aid' and turn-key contracts

Technology and equipment purchased on a competitive international basis ensures that they are most suitable and obtained on reasonable terms, resulting in considerable savings in project costs. In turn-key and 'tied aid' projects, supply is narrowed down to one source, resulting in increased cost to the recipient country. According to a UNCTAD study, by aid tying the recipient incurs substantial direct and indirect 'excess costs' which reduce the value and usefulness of aid. Case studies have indicated that direct 'excess costs' range from 10 to 20 per cent (Iran 10 per cent, Chile 12.4 per cent and Tunisia 20 per cent). Other independent studies have confirmed the 'excess costs' of tying aid to be much higher - as high as 30 to 50 per cent. In addition, there are substantial indirect costs in the form of higher prices for spares, higher cost of foreign personnel,higher development costs, etc.

'Watch-dog agency'

Valuable lessons can be drawn from the Indian experience of foreign assistance to steel industry. As aid negotiations and collaboration agreements were conducted by bureaucrats without any technical experience - local expertise though available was excluded from them - avoidable difficulties and mistakes have arisen in the subsequent design and engineering of the projects, resulting in high plant costs. The aid-giving country's pressure and insistence on providing its own experts for project report and engineering, have also been responsible for this.

A number of countries have specific experience, particularly of the pitfalls and mistakes, of aid from both the western and socialist countries. Experts from these countries are now in a position to share their experience with other developing countries. It is suggested that such experts from the developing countries, perhaps under UNIDO auspices, may serve as the 'watch-dog agency' to scrutinise aid offers and to ensure that the recipient country benefits by them.

Foreign aid is scarce and costly. It is therefore not enough just to obtain foreign aid; it is essential to see that it is properly utilised.

Conclusion

Steel development is essential for industrial growth. The technological revolution in iron and steelmaking presents a challenge and opportunity to planners and engineers in developing countries. Undoubtedly there will be problems, however, these are not beyond the ingenuity of the developing countries to tackle with the enlightened support of the developed countries.

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## SUMMARY

This paper seeks to present a model of possible future steel development programme for the Arab world by 2000 A.D., and the long-term planning and associated technical inputs required to implement the programme.

The steel industry enjoys a high priority in the development plans of most countries, because of the known dynamic effect of steel development on the rest of the economy. The installation of a steel plant sets in motion an entire chain of economic activities, providing the growth stimuli not only to those industries which use its output, but also those from which it obtains its raw materials and services. Steel is, in fact, indispensable to progress.

The Arab countries, unlike other developing countries, are placed in more propitious circumstances for the speedy implementation of a massive steel development programme. They are in the happy position of having large surplus oil revenues which can be gainfully ploughed back into the economy for steel development. They are also well placed in respect of major raw materials such as iron ore, manganese ore, limestone and dolomite, which would meet adequately the raw material needs of the iron and steel industry. The bulk of the fuel and energy requirements of the steel industry can also be met by the rich oil and natural gas reserves, but some coal and coke will have to be imported. Though local design and engineering facilities as well as equipment manufacturing capacity may be lacking in the Arab region, these are only by themselves not insurmountable obstacles to rapid steel development, in view of the ready access the Arab countries can have to modern steel technology.

The steel development programme in the Arab countries could be conveniently studied in two time-horizons - the first phase of intense preparation and moderate growth up to 1985 and the second, from 1985 to 2000 A.D. with a much higher rate of growth, symbolising the take-off of the economy.

Up to 1985, the Arab steel production is likely to be mainly concerned with the satisfaction of domestic demand, with limited export possibilities. Accordingly, the likely requirements of steel by 1985 have been estimated on the basis of the correlation between the gross domestic product and steel consumption, assuming different growth rates. It is estimated that steel consumption of the Arab world by 1985 may be around 25 to 30 million tons.

The period after 1985 would be the beginning of the take-off for the Arab economy as well as for the steel industry. The Arab countries would emerge as major producers and exporters of steel by 1985. The steel export potential of the Arab countries may sound strange in the present context, but this is not beyond their capacity because of their unique position in finances, energy, raw materials, access to modern technology etc. The achievements of Belgium, Luxembourg, Japan etc have amply demonstrated that high per capita production is attainable irrespective of the size of the country or population. While in the case of Luxembourg it may be argued that it is easy to show a high per capita production because of its very small population, it is not so in the case of countries such as West Germany, Japan etc which have larger populations. Japan with a population of over 100 millions has achieved a per capita production of 1,100 kg, while large countries with huge population like USA and USSR have per capita productions of over 600 kg and 500 kg respectively.

It is therefore reasonable to assume that by 2000 A.D., the Arab world can hope to achieve a production level of 500 kg to 700 kg per capita. The population of Arab countries is likely to reach 300 millions by 2000 A.D. and on the basis of the per capita production assumed above, the steel production will be around 150 million tons to 210 million tons. This target is not only realistic, but also well within the Arab world's resources and capabilities. When we consider that USSR accomplished an increase of about 90 million tons in the last two decades; and more recently Japan has added about 90 millions to its steel capacity during even a shorter period of ten years between 1963 and 1973, in spite of its having to import all the major iron and steelmaking raw materials. Thus a planned development to 150 to 200 million tons of annual steel capacity spread over a period of 26 years would not be impossible. The advantageous position enjoyed by the Arab world coupled with the political will and confidence in its own destiny should enable the Arab countries to reach the 200 million target by 2000 A.D.

In this context, the need for long-term planning and advance action for coordinated development is specially emphasised. Detailed studies have to be carried out at the technical level to work out the implications of the overall targets and to define the steps which need to be simultaneously initiated to achieve integrated progress over a wide front. Advance action has to be taken to train and develop the manpower required for the steel development. The early creation of a nucleus of design and engineering capability is also imperative for the successful implementation of the steel development programme. In the initial stages, the assistance and guidance of a competent and experienced consultancy organisation specialised in the field would be valuable, who working closely with the Arab organisations, would assist them in developing local design and engineering services as well as manpower, and in evolving the institutional framework and procedures required for the speedy implementation of the 200 million steel programme by 2000 A.D.

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## Introduction

The iron and steel industry enjoys a high priority in the development plans of most countries, because of the known dynamic effect of steel development on the rest of the economy. The installation of a steel plant sets in motion an entire chain of economic activities, providing the growth stimuli not only to those industries which use its output, but also those from which it obtains its raw materials and services. Steel is, in fact, indispensable to modern living. In agriculture, industry, transport, in engineering and construction, steel is the first essential and it also forms the basis of the machinery and tools which make nearly every product we use.

The major constraints in many developing countries for the speedy implementation of their steel development programmes are scarcity of financial resources, absence of local design and engineering organisations for the planning, design and construction of steel plants, and the lack of indigenous equipment manufacturing facilities - even though they may not be lacking in raw materials and natural resources.

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The Arab countries[1] are placed in more propitious circumstances in some of these respects. They are in the happy position of having favourable balance of payment and large surplus funds earned from their oil revenues which can be ploughed back into the economy for developmental projects. Since oil is a wasting asset, the utilisation of the surplus revenues on crucial developmental projects like steel should be of special importance to the Arab countries in their efforts to promote a balanced growth not only of their individual economies, but of the Arab region as a whole.

The Arab countries are also well placed in respect of major raw materials like iron ore, manganese ore, limestone and dolomite. The total estimated iron ore reserves are about 8,000 million tons of which 2,500 million tons are proved. Iron ore mines are now being worked in Mauritania, Morocco, Algeria, Tunisia, Arab Republic of Egypt and Sudan, but the bulk of the ore is being exported. Occurrences of manganese ore have also been reported in a number of Arab countries including Algeria, Morocco and Jordan. These deposits, when developed, should be able to meet the manganese ore requirements of the Arab iron and steel industry. Limestone and dolomite are reported to occur widely in a number of Arab countries, but

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(1) The Arab countries comprise: Mauritania, Morocco, Algeria, Tunisia, Libya, Egypt, Syria, Lebanon, Jordan, Iraq, Kuwait, Gulf Emirates, Saudi Arabia, Sudan, North Yemen and South Yemen.

detailed exploration work and investigations would be necessary to establish the reserves and quality. It is expected that iron and steel industry's requirements can be adequately met from domestic sources.

It is only in respect of coking coal that the Arab countries are deficient, but this is more than amply compensated by their large petroleum and natural gas reserves. They are, however, using at present only 10 per cent of the total production of their oil and natural gas. It is possible that the bulk of the fuel and energy requirements of the iron and steel industry can be met by the oil and natural gas reserves, while some coking coal will also have to be imported.

Though a well-developed design and engineering organisation may be lacking and the indigenous equipment manufacturing capacity may be absent at present in the Arab region, these are by themselves not insurmountable obstacles and need not hold up the rapid development of the iron and steel industry in the Arab countries. There is already a growing awareness in the Arab world about the immediate need to develop local design and engineering skills as well as the utilisation of local materials and resources. However, in the initial stages, much of the technology and equipment required will have to be obtained from the industrially advanced countries; and simultaneously indigenous engineering

services need to be developed and equipment building facilities created to the extent possible, to meet the requirements of the Arab iron and steel industry.

Given the political lead and policy guidelines on the dimensions of the steel development programme and the time horizons for achieving the targets, a suitable perspective must be evolved which would enable the Arab countries eventually to play a decisive role in the world steel industry, as in the case of oil.



PERSPECTIVE OF ARAB STEEL DEVELOPMENT

This paper seeks to present a model of possible future steel development programme for the Arab world by 2000 A.D. It will be appreciated that this long-term forecast necessarily is tentative, particularly in a sensitive sector like steel which is prone to the interplay of multitudes of both known and unknown variables. At the same time, twentysix years is too short a period in the history of nations, though it may appear too long from the point of view of life span of individuals.

Such forecasts are most valuable for presenting the broad dimensions of the problem which would ultimately assist the planners in formulating the steel development policies. The following paragraphs seek to outline a logical sequence of events in order to show how, starting from the present

situation in the steel industry in the Arab countries, a future status reaching up to 2000 A.D. might evolve. The main purpose of the forecast is not to predict the future but to delineate the contours of the programme and to visualise the developmental efforts required to implement it.

The importance attached to the iron and steel industry in the developing countries is reflected by a 60 per cent increase in their steel production during the last decade with the objective of self-reliance which has been the guiding force in the developmental planning of most of these countries. However, the programme for steel development in the Arab world is still in the embryonic stage. Indigenous production from integrated steel plants is confined only to Algeria, Arab Republic of Egypt and Tunisia. The total output from these plants meets only a fragment of the total domestic demand of the Arab countries, and almost the entire consumption of the Arab world is at present met through imports. Table 1 gives the steel consumption from 1965 to 1971 of the Arab world and illustrated in Figure 1.

Stages of development

Steel development could be roughly divided into two stages. The first stage would be the period of intense preparation and implementation of the steel development

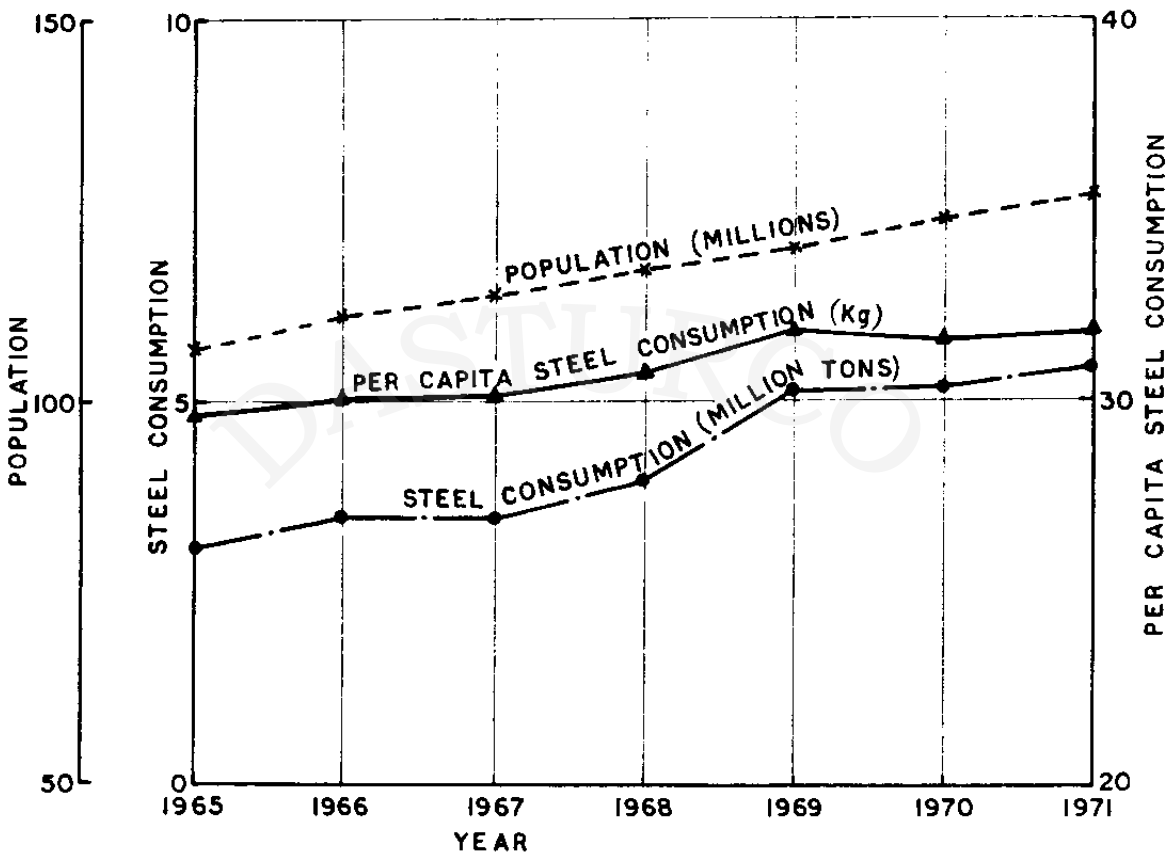


FIG. 1 – PAST TREND IN POPULATION, STEEL CONSUMPTION AND PER CAPITA STEEL CONSUMPTION OF ARAB WORLD

TABLE 1 - APPARENT STEEL CONSUMPTION OF ARAB COUNTRIES

| Year | Steel consumption '000 tons | Population '000 Nos | Per capita steel consumption kg |
|---|---|---|---|
| 1965 | 3,121 | 106,860 | 29 |
| 1966 | 3,500 | 111,290 | 31 |
| 1967 | 3,507 | 114,500 | 31 |
| 1968 | 4,037 | 117,870 | 34 |
| 1969 | 4,203 | 121,240 | 35 |
| 1970 | 4,266 | 124,780 | 34 |
| 1971 | 4,501 | 128,230 | 35 |

Source: Study of development possibilities of iron and steel in Arab countries for the Industrial Development Center for Arab States. Arab Iron and Steel Union and Dastur Engineering International GmbH, Oct 1973

programme and the second would be the period of take-off. In the first stage, the Arab countries would be able to progressively reduce their steel imports; and in the next stage, they will not only meet the home demand but also will be net exporters of steel. A study of the history of steel development of many countries would indicate that a gestation period of about 10 years is usually required for absorbing and developing the required technical know-how and skills, as well as the development of other inter-related sectors. Therefore, the steel development of the Arab world could be conveniently studied in two time phases, that is, the first phase up to 1985 with a moderate growth rate and the second phase from 1985 to 2000 A.D. with a much higher growth rate.

Reasons for the breakthrough

There are several important factors which would contribute significantly to the great leap forward of the Arab world with respect to its steel development programme. Firstly, the planners of the Arab world have realised that programme of rapid industrial development is the only way of lifting the Arab economies from their current dependence on oil revenues. Secondly, after the recent world-wide development of energy crisis, the advantages of locating energy-intensive industries like steel in the areas where cheap energy is available, are being increasingly realised. Arab countries with their abundant fuel resources are a natural choice. In these countries, vast amounts of energy which could be put to economic use are now being wasted. For instance, the natural gas now being flared by Saudi Arabia alone at the current level of production of 6 million barrels crude oil per day could theoretically provide the energy required for a steel production of 20 million tons per year.

Thirdly, the energy crisis is slowing down the tempo of steel development in a number of developed countries. This, coupled with the stringent anti-pollution laws now in force in many industrialised countries, may eventually lead to the setting up of new iron and steelmaking facilities in those parts of the world where energy in clean forms is readily

available and environment control is not an immediate issue. But the largest single factor that would accelerate the growth of investment in steel would be the rise in the per capita income. The present rise in oil prices has substantially augmented the oil revenues of the major oil producing Arab countries. Even if the production of crude oil is maintained at the present level, the accrued additional revenue would be enormous. This huge accumulation of finance would enable the Arab countries to industrialise themselves rapidly, so that the overall level of per capita steel consumption could be raised to the level at least of some of the industrialised countries.

Steel up to 1985

The past growth rate of steel consumption between 1965 and 1971 in the Arab countries was only 5.0 per cent while the per capita income showed a slightly higher growth rate during the same period. The level of income of individual countries like Libya, Saudi Arabia, Kuwait, Iraq and Morocco has risen at much higher rates (10 to 12 per cent during 1965 to 1970). The growth rates of incomes of the more populous countries like Egypt, Algeria and Sudan which between them account for 50 per cent of the total population of the Arab world, are however not so high as this resulted in lowering the overall rate of growth of income of the Arab world as a whole.

The estimated population of this region by 1985 is given in Annexure I and are summarised in Table 2.

TABLE 2 - POPULATION OF THE ARAB WORLD BY 1985
(millions)

| Region | Average growth | 1975 | 1980 | 1985 |
|---|---|---|---|---|
| Mediterranean | 2.9 | 93 | 108 | 125 |
| Gulf sub-region | 3.0 | 16 | 20 | 24 |
| Red Sea sub-region | 2.9 | 36 | 41 | 48 |
| Total .. | 3.1 | 145 | 169 | 197 |

Source: Arab Iron and Steel Union, Algiers.

Up to 1985, the growth of steel production in the Arab world would be mainly directed towards the satisfaction of domestic demand and because of this fact any large scale export possibilities of steel up to 1985 would be limited. In view of this, the correlation between steel consumption and gross domestic product would be a good yardstick to assess the steel requirements till 1985. For this purpose, the growth of GDP during the next 15 years has been projected based on the analysis of past growth rates, as shown below:

| Year | Assumed growth rate % | Projected GDP mill US $ | Per capita GDP US $ |
|---|---|---|---|
| 1975 | 8 | 50,000 | 345 |
| 1980 | 9 | 80,000 | 472 |
| 1985 | 10 | 128,000 | 650 |

As the steel consumption projection up to 1985 has to be based on the relationship of per capita GDP and steel

consumption, an appropriate cross country regression line has been developed. This is presented in Figure 2. The likely per capita steel consumption levels for the years 1975, 1980 and 1985 are given below:

| Year | Per capita steel consumption kg |
|---|---|
| 1975 | 60 |
| 1980 | 92 |
| 1985 | 140 |

The projected steel consumption figures derived on the basis of estimated population by 1985 are given in Table 3 and diagramatically shown in Figure 3.

TABLE 3 - PROJECTED STEEL CONSUMPTION - 1985

| Year | Per capita steel consumption kg | Population millions | Steel consumption million tons |
|---|---|---|---|
| 1975 | 60 | 145 | 8.7 |
| 1980 | 92 | 169 | 15.5 |
| 1985 | 140 | 197 | 27.6 |

Projection by various growth rates - 1985

The trend of past steel consumption shows a growth of about 7 per cent between 1965 and 1970. Assuming three different sets of possible growth rates, the projected steel consumption for the years 1975, 1980 and 1985 would be as indicated in Table 4 and illustrated in Figure 3.

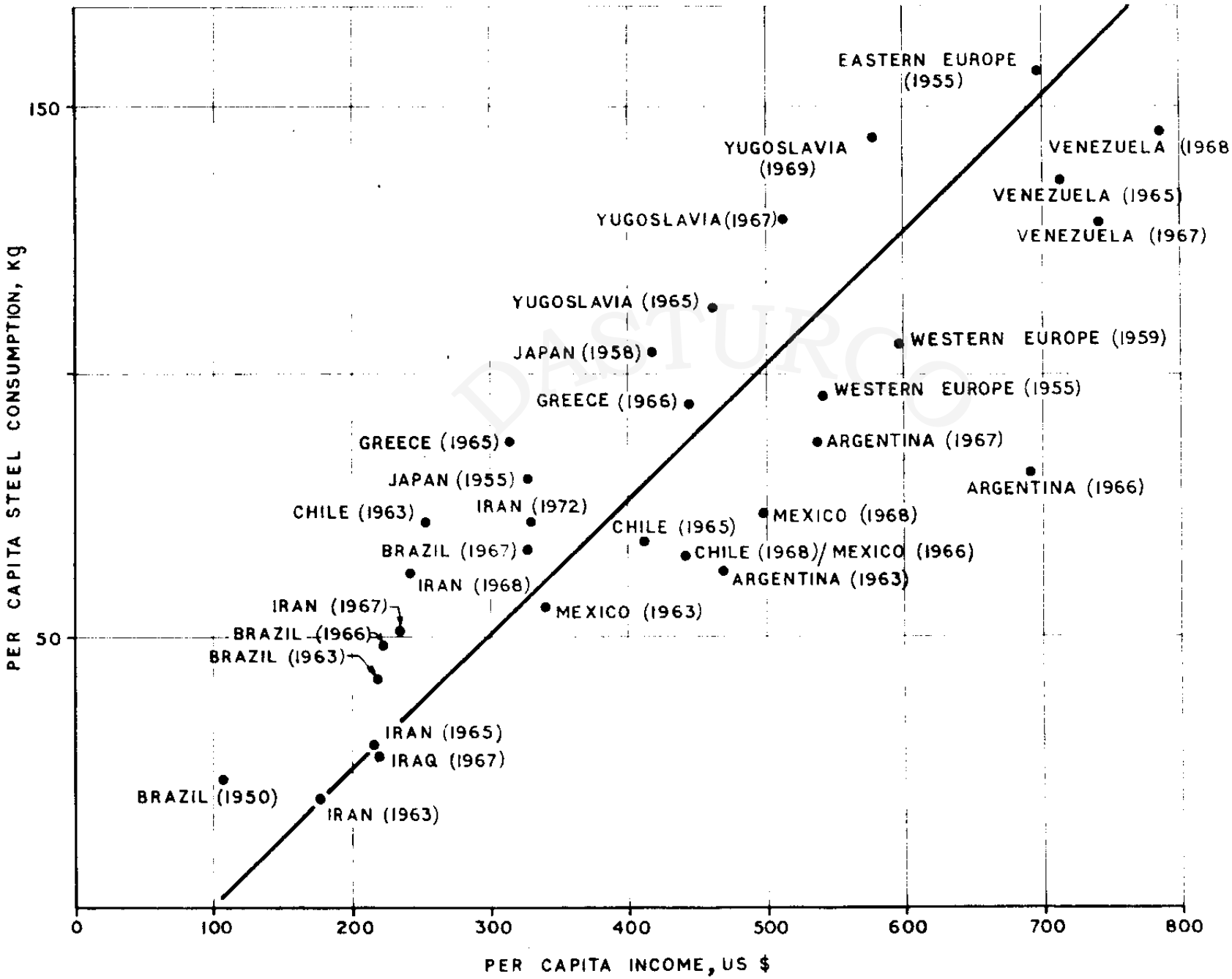


FIG. 2 — CROSS COUNTRY REGRESSION LINE
(PER CAPITA CONSUMPTION VS PER CAPITA INCOME)

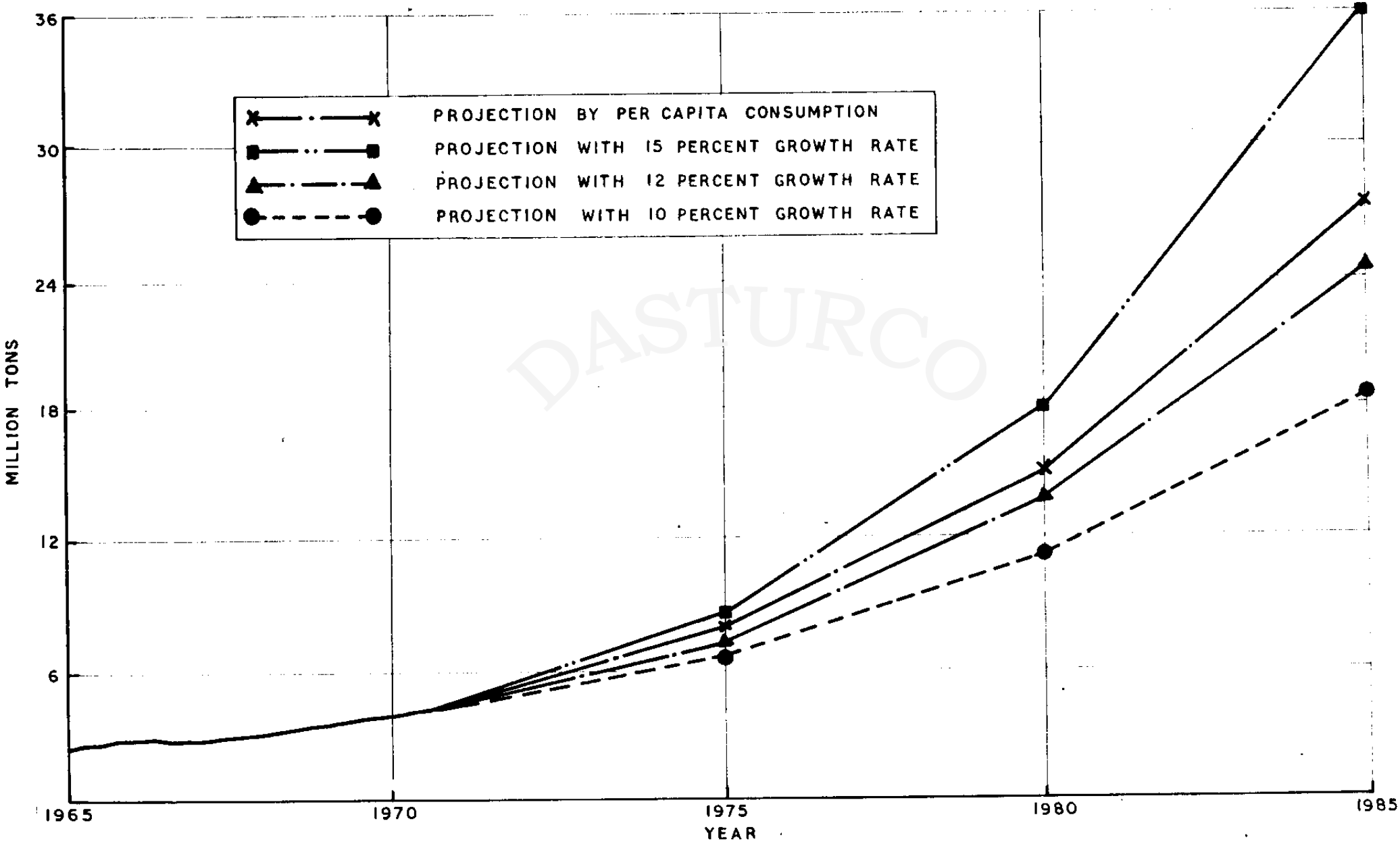


FIG. 3 — PROJECTED STEEL CONSUMPTION – 1985

TABLE 4 - PROJECTED STEEL CONSUMPTION OF ARAB WORLD AT VARIOUS GROWTH RATES

| Assumed growth rates | Demand in million tons | | |
|---|---|---|---|
| | 1975 | 1980 | 1985 |
| 10 | 7.2 | 11.5 | 18.4 |
| 12 | 7.8 | 14.2 | 25.0 |
| 15 | 9.0 | 18.0 | 36.0 |

It would be noted from Tables 3 and 4 that the annual consumption of steel in the Arab countries may range between 28 and 36 million tons by 1985.

Steel beyond 1985

The period after 1985 would be the beginning of the take-off for the Arab economy, due to the earlier gains made through steel development. The abundant availability of capital, the pre-eminent position enjoyed in respect of fuel and energy and also the ready access to modern technologies are some of the principal factors which would enable the Arab world to become one of the highly developed regions by the end of the century. In this long stride, further development of steel industry would undoubtedly be of prime importance, as steel is essential for the development of all sectors, including agriculture. The Arab countries, hitherto importers of steel, would slowly emerge as major producers by 1985, and beyond 1985 they could look forward to entering foreign markets also. The current steel development programmes of Algeria, Egypt, Libya and other countries are evidence of these continued efforts of the Arab world to become self-sufficient in steel.

The potential of the Arab countries as steel exporters may sound strange in the present context, but because of their unique position in finance and energy coupled with the fact that they have also some of the major raw materials, it will not be an impossible task for them to achieve this. In this context, it would be more relevant to set a target for Arab steel capacity on the basis of per capita production rather than per capita consumption as the per capita production would reflect not only domestic consumption but also the export requirements. The achievements of Belgium, Luxembourg, Japan etc have shown that a very high per capita production is attainable, irrespective of the size of the country or the population. However, while in the case of Luxembourg it may be argued that it is easy to show a high per capita production because of its very small population, it is not so in the case of countries like Swedon, Czechoslovakia, West Germany, Belgium, Japan etc which have larger populations. To cite only one example, Japan with a population of over 100 millions has reached a per capita production figure of 1,100 kg. This is also the case even of large countries with large populations like the USA which has a per capita production of over 600 kg and USSR with over 500 kg where the per capita production has been rising continuously during the last fifty years and is still growing.

The per capita steel production of these countries for the years 1965-73 is detailed in Annexure 2 and summarised in Table 5. The trend for the individual countries is illustrated in Figure 4.

TABLE 5 - TREND IN PER CAPITA PRODUCTION OF SOME COUNTRIES (in kg)

| Year | Belgium | Luxembourg | Japan | West Germany | Sweden | Czechoslovakia | USA | USSR |
|---|---|---|---|---|---|---|---|---|
| 1965 | 980 | 1,390 | 418 | 650 | 610 | 615 | 615 | 392 |
| 1966 | 940 | 1,320 | 482 | 618 | 615 | 646 | 618 | 415 |
| 1967 | 1,020 | 1,340 | 623 | 635 | 610 | 702 | 578 | 422 |
| 1968 | 1,210 | 1,430 | 660 | 705 | 645 | 738 | 592 | 448 |
| 1969 | 1,330 | 1,620 | 800 | 770 | 662 | 750 | 630 | 458 |
| 1970 | 1,300 | 1,610 | 900 | 755 | 670 | 790 | 582 | 475 |
| 1971 | 1,290 | 1,560 | 845 | 675 | 630 | 842 | 525 | 492 |
| 1972 | 1,480 | 1,580 | 915 | 725 | 610 | 868 | 570 | 502 |
| 1973 | 1,590 | 1,700 | 1,110 | 810 | 635 | 890 | 635 | 520 |

Per capita production by 2000 A.D.

From the above it is seen that the per capita production could be anywhere from 600 kg to over 1,000 kg. This is true, irrespective of the size of the countries for the population or the raw material resources etc. Therefore, it is reasonable to assume that by 2000 A.D. the Arab world can hope to achieve a per capita production level ranging from 500 kg to 700 kg. This could be achieved by adopting

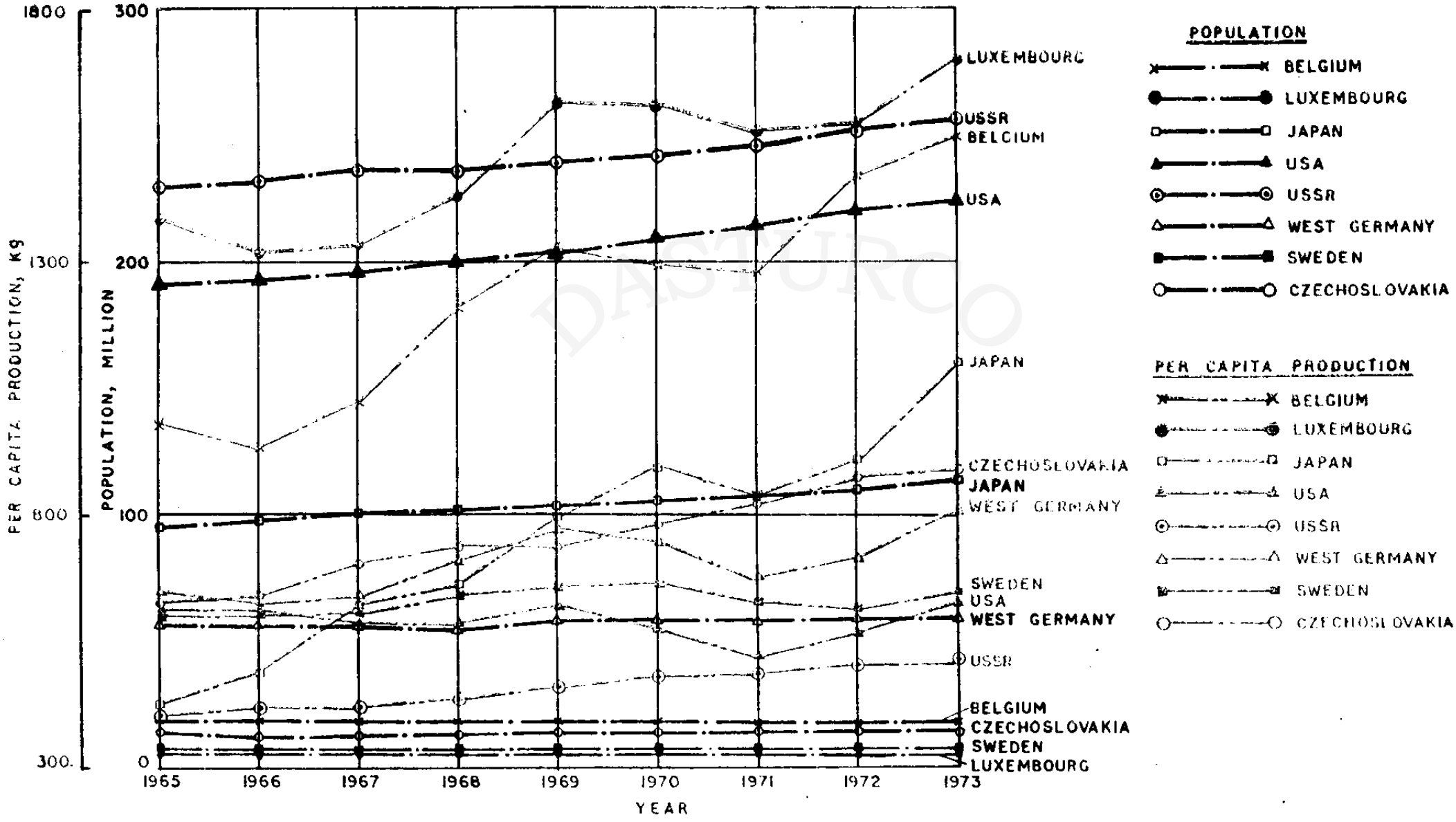


FIG. 4 —TREND IN PER CAPITA PRODUCTION OF SOME SELECTED COUNTRIES

appropriate development strategies and well planned programmes for the entire region. A perspective of steel development for the Arab world visualised in this context is presented in Figure 5.

Population by 2000 A.D.

Based on the population figures up to 1985 furnished by Arab Iron and Steel Union, and assuming the same growth rates for the different regions, the population has been projected beyond 1985 up to 2000 A.D. as indicated in Table 6.

TABLE 6 - ESTIMATED POPULATION - 2000 A.D.

| Region | Population (millions) | | | |
|---|---|---|---|---|
| | 1985 | 1990 | 1995 | 2000 |
| Mediterranean | 125 | 145 | 165 | 185 |
| Gulf sub-region | 24 | 29 | 34 | 40 |
| Red Sea sub-region | 48 | 56 | 65 | 75 |
| Total .. | 197 | 230 | 264 | 300 |

Thus on the basis of the per capita steel production discussed earlier, and the estimated population mentioned in the above table, the total steel production that the Arab countries could aim at by 2000 A.D. can be projected.

STEEL PRODUCTION BY 2000 A.D.

In 2000 A.D., at a level of population of 300 million and per capita production of 700 kg, the annual steel production will be around 210 million, while at 500 kg per capita, the production would be 150 million tons, as can be seen from Table 7.

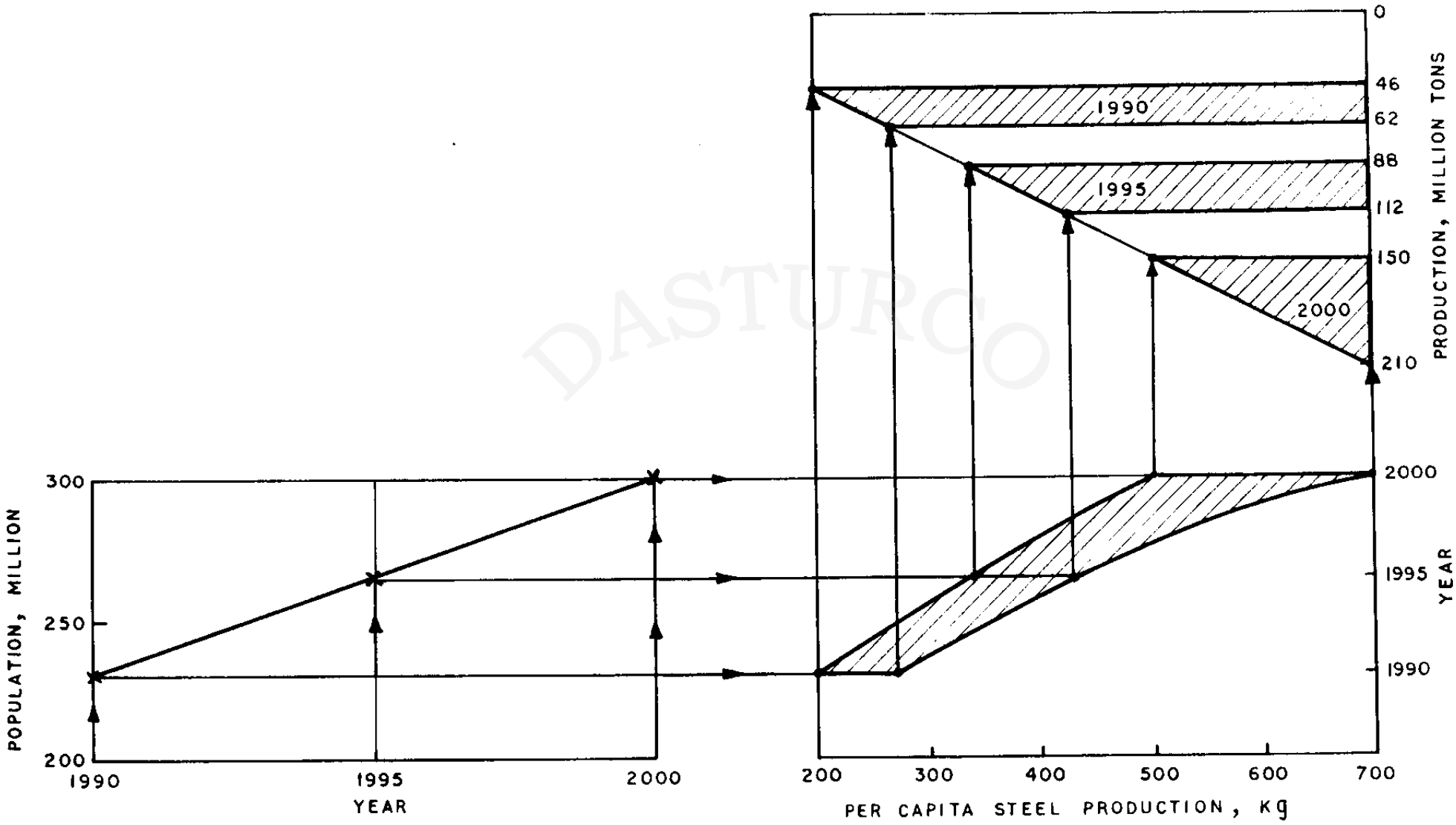


FIG.5 — PERSPECTIVE OF ARAB STEEL BY 2000 A.D.

TABLE 7 - PRODUCTION AND CAPACITIES OF STEEL BY 2000 A.D.

| Year | Population million | Per capita production Higher limit kg | Per capita production Lower limit kg | Steel production Higher limit million tons | Steel production Lower limit million tons |
|---|---|---|---|---|---|
| 1990 | 230 | 270 | 200 | 62 | 46 |
| 1995 | 264 | 425 | 335 | 112 | 88 |
| 2000 | 300 | 700 | 500 | 210 | 150 |

The target of 200 million tons by 2000 A.D. would not be unrealistic if the Arab steel development plan is pursued vigorously, with the full support of all the member countries. The favourable factors discussed earlier would reinforce this possibility. In view of this, the target is not only realistic, but well within the Arab world's capabilities.

Table 8 clearly indicates how the steel development achieved by selected countries during the last two decades. It will be observed that USSR accomplished an increase of more than 90 million tons of steel production during the last two decades; and Japan added more than 90 million tons to her steel production during an even shorter period of 10 years between 1963 and 1973, in spite of the fact that it has to import all the major iron and steelmaking raw materials. The achievements of other countries are also substantial. These figures give added support to the possibility of Arab countries jointly achieving a target of 200 million tons of steel by 2000 A.D.

TABLE 6 - CRUDE STEEL PRODUCTION IN SELECTED COUNTRIES 1953-1973
(million tons)

| Country | 1953 | 1963 | 1973 |
|---|---|---|---|
| Belgium | 4.53 | 7.52 | 15.53 |
| France | 10.00 | 17.56 | 25.26 |
| West Germany | 18.10 | 31.60 | 49.52 |
| Italy | 3.60 | 10.16 | 20.98 |
| Luxembourg | 2.66 | 4.03 | 5.92 |
| Netherlands | 0.86 | 2.34 | 5.61 |
| EEC | 39.75 | 73.31 | 122.82 |
| Japan | 7.66 | 31.50 | 119.33 |
| Poland | 3.60 | 8.00 | 14.20 |
| USSR | 38.10 | 80.23 | 131.00 |
| China | 1.77 | 8.00 | 25.00 |

Sources: 1) IISI Bulletin, January 21, 1974
2) International Steel Statistics, British Steel Corporation, 1970

The world steel consumption by 1985 would be about 1,145 million tons according to some projections. If this trend continues even beyond 1985, by 2000 A.D. world would be producing over 1,500 million tons of steel. The world production of crude steel in 1973 was about 700 million tons. This would mean that at least another 800 million tons of steel production would be added by 2000 A.D. Since the bulk of the new steel capacity is likely to be created within the developing countries, it would not be unreasonable to assume that about 25 per cent of this new steel production could be the share of the Arab world. By the proper planning and allocation of resources towards achieving this objective, it should be possible for the Arab countries to reach the 200 million target by 2000 A.D.

LONG-TERM PLANNING FOR STEEL

In this context, the need for planning the steel industry in long time spans needs to be specially emphasised, particularly(because the installation of new steel capacity together with the development of infrastructure and ancillary facilities, such as new mines, water supply, power, transport and communications, is a time consuming process, extending in many cases from eight to ten years. The current steel development programme should not only serve as a continuing link with the steel development in progress, but also concern itself as much with advance preparation for the development of the steel industry in the subsequent years, as with the achievements of the current plan targets.)

Advance action for coordinated development

As in the case of planning for any key sector, mere formulation of targets is obviously not adequate. In line with the perspective planning for the given time-horizon, detailed studies need to be undertaken at the technical level to work out the implications of the overall targets and define the steps which must be simultaneously initiated to achieve integrated progress over a wide front. Steel development is a complex task involving a vast number of forward and backward linkages, and requires large inputs of various materials, resources, services, as

well as efficient utilisation of all products and by-products. Unless each constituent in this chain of inter-related activities functions adequately and in time, a number of difficulties are likely to occur at various points all along the line in the steel development programme.

Technical studies

The detailed technical and economic studies envisaged would indicate the steel capacity to be created in each country and the product-mix, keeping in view the overall steel development programme for the entire Arab world by 2000 A.D. They would focus attention on the possible plant locations and sites in relation to plant size. Simultaneously the work must start on the detailed geological and laboratory investigations to arrive at qualitative assessment of raw materials. The studies would also indicate the action to be taken by the Arab countries individually as well as the Arab world as a whole, to develop the transport, water and power facilities for the additional steel capacity. Study of alternative technology would also be necessary keeping in mind the objectives of utilising to the maximum local raw materials. An important aspect of these long range studies would be to work out the pattern of future equipment requirements for the steel industry and to examine the feasibility of progressively manufacturing within the Arab states some of the items of equipment as part of the industrial development programmes.

Manpower and managerial development

At the same time, manpower requirements for the envisaged steel programme need to be studied carefully and in great detail so that appropriate educational and training programmes for various cadres of personnel may be devised well in advance to meet the given job specifications. Further, special training facilities have to be created for the development of managerial talent and skills and the necessary arrangements for setting up efficient management structures and procedures for the construction and operation of steel plants will have to be evolved and implemented.

Design organisation

The massive steel development programme would require vast technological inputs in the form of design and engineering services. The need for establishing local design and engineering organisations/centres in developing economies is increasingly recognised, as indigenous design and engineering effort acts as a 'prime mover' in the country's industrial development. However, the accent on rapid industrialisation has necessitated the import of technology from advanced countries which has been a characteristic feature of the international flow of steel technology during the last two decades. But this heavy and continued dependence on foreign technical assistance has not always been in the interest of the recipient country.

As the experience of some developing countries has shown, in many cases, there has been less effective transfer of know-how and little opportunity for building up local engineering and design experience which could be utilised for setting up new steel capacity in the country. The unfamiliarity of the foreign agencies with local materials and industrial conditions, often necessitate the use more of imported materials and equipment than is actually required. Thus opportunities for the development of local skills and equipment manufacture are lost and the country's efforts to achieve self-reliance are hampered.

Thus, while recognising the need and usefulness of foreign technical assistance for the growth of iron and steel industry in the initial years, the early creation of a nucleus of design and engineering capacity for the planned development of the steel industry is therefore imperative, particularly in the context of the massive steel programme envisaged for the entire Arab world. Some of the Arab States have already established such nuclei within their countries. On the inter-state level, organisations like the Industrial Development Centre for the Arab States (IDCAS) and the Maghreb Centre of Industrial Studies have also been active in the field. But these institutions have not been specifically set up for providing design and engineering services for the iron and steel industry or for promoting its development.

With the setting up of the Arab Union for Iron and Steel (AISU), however, the Arab States have moved a step nearer the coordinated and integrated development of the iron and steel industry on a regional basis in the Arab world. It would be logical, therefore, to follow this up with the establishment of a full-fledged steel design and engineering institute, perhaps under the aegis of AISU, so that the requisite design and engineering services could be available in due course to support the long-term steel development programme of the entire region. Such a design and engineering organisation can play a significant role in the planning, design and construction of steel plants in the region and will be in a better position to understand fully the problems of the steel industry in the context of the regional planning, harmonizing national objectives with regional requirements.

The experience of developing countries like India provides a good example of a developing country which has not only established and developed its own design and engineering services for iron and steel, but is in a position to share its experience with Arab States and to assist them in setting up their own design organisations.

Obviously, a design and engineering organisation cannot be set up like a factory with exclusively imported know-how and equipment. The nucleus of the design force must

be created with Arab personnel who should be given adequate scope and opportunities to develop under competent leadership and guidance. In the initial stages, for the development of a strong and competent design organisation, the assistance and guidance of a consultancy organisation specialised in the field, preferably one with the specific experience of design and engineering of steel plants, recruitment and training of design personnel and evolution and development of a result-oriented multi-disciplinary organisation would be required.



As the consultancy organisation will have the necessary experience, organisation, on-the-job training facilities and documentation required, it would be in a better position to bring about the effective transfer of requisite expertise and methodology for the establishment of the design institute at the earliest, than would be the case if individual experts were recruited. The consultancy organisation, working in close collaboration with Arab organisations, would prepare the overall design of the institute, assist in the recruitment and training of the key personnel, establish the nucleus of the design organisation and develop the organisation structure most suited to the Arab requirements. The consultants would also evolve modern design and engineering practices and arrange for the on-the-job training of Arab personnel at their home

offices, supplemented by training at steel plants and equipment manufacturing units. Simultaneously the experts from the consultancy organisation stationed at the headquarters of the proposed design and engineering centre will also train Arab personnel in the various aspects of design and consultancy services.

ANNEXURE - I

POPULATION OF THE ARAB WORLD BY 1985

(in million)

| Country | Average rate of growth % | 1975 | 1980 | 1985 |
|---|---|---|---|---|
| MEDITERRANEAN | | | | |
| Mauritania | 2.2 | 1.31 | 1.46 | 1.62 |
| Morocco | 3.0 | 17.14 | 20.47 | 23.69 |
| Algeria | 3.3 | 16.80 | 19.78 | 23.26 |
| Tunisia | 2.0 | 5.72 | 6.33 | 6.98 |
| Libya | 4.0 | 2.35 | 2.86 | 3.48 |
| Egypt | 2.9 | 39.39 | 45.19 | 52.25 |
| Syria | 3.0 | 7.26 | 8.67 | 10.04 |
| Lebanon | 2.5 | 3.17 | 3.59 | 4.06 |
| Sub-total | 2.9 | 93.14 | 108.35 | 125.38 |
| GULF SUB-REGION | | | | |
| Jordan | 3.1 | 2.63 | 3.08 | 3.60 |
| Iraq | 3.2 | 11.06 | 12.93 | 15.16 |
| Kuwait | 10.0 | 1.22 | 1.96 | 3.15 |
| Gulf Emirates | 3.3 | 1.34 | 1.58 | 1.86 |
| Sub-total | 3.0 | 16.25 | 19.55 | 23.77 |
| RED SEA SUB-REGION | | | | |
| Saudi Arabia | 2.7 | 8.86 | 10.12 | 11.60 |
| Sudan | 3.4 | 18.47 | 21.87 | 25.92 |
| Yemen (North and South) | 2.8 | 8.26 | 9.50 | 10.91 |
| Sub-total | 2.9 | 35.59 | 41.49 | 48.43 |
| TOTAL .. | 3.1 | 144.98 | 169.39 | 197.58 |

Source: Arab Iron and Steel Union (AISU), Algiers

ANNEXURE - II

*PRODUCTION, POPULATION AND PERCAPITA PRODUCTION OF SOME SELECTED COUNTRIES*

ANNEXURE - II

| Country | 1965 | | | 1966 | | | 1967 | | | 1968 | | | 1969 | | | 1970 | | | 1971 | | | 1972 | | | 1973 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD | POP | PRD | PERCAP PRD |
| Belgium | 9.406 | 9.2 | 980 | 9.466 | 8.9 | 940 | 9.526 | 9.7 | 1,020 | 9.586 | 11.6 | 1,210 | 9.646 | 12.8 | 1,330 | 9.66 | 12.6 | 1,300 | 9.673 | 12.5 | 1,290 | 9.73 | 14.5 | 1,480 | 9.79 | 15.5 | 1,590 |
| Luxembourg | 0.330 | 4.6 | 1,390 | 0.333 | 4.4 | 1,320 | 0.335 | 4.5 | 1,340 | 0.338 | 4.8 | 1,430 | 0.340 | 5.5 | 1,620 | 0.342 | 5.5 | 1,610 | 0.344 | 5.2 | 1,560 | 0.346 | 5.5 | 1,580 | 0.348 | 5.9 | 1,700 |
| Japan | 98.3 | 41.2 | 418 | 99.1 | 47.8 | 482 | 100.3 | 62.2 | 623 | 101.4 | 66.9 | 660 | 102.6 | 82.2 | 800 | 103.7 | 93.3 | 900 | 104.9 | 88.6 | 845 | 106.1 | 96.9 | 915 | 107.2 | 119.3 | 1,110 |
| West Germany | 56.523 | 36.8 | 650 | 57.069 | 35.3 | 618 | 57.615 | 36.7 | 635 | 58.161 | 41.2 | 705 | 58.707 | 45.3 | 770 | 59.5 | 45.0 | 755 | 59.8 | 40.3 | 675 | 60.4 | 43.7 | 725 | 61.0 | 49.5 | 810 |
| Sweden | 7.430 | 4.7 | 610 | 7.792 | 4.8 | 615 | 7.854 | 4.8 | 610 | 7.916 | 5.1 | 645 | 7.98 | 5.3 | 662 | 8.2 | 5.5 | 670 | 8.4 | 5.3 | 630 | 8.7 | 5.3 | 610 | 9.0 | 5.7 | 635 |
| Czechoslovakia | 14.106 | 8.6 | 615 | 14.184 | 9.1 | 646 | 14.262 | 10.0 | 702 | 14.340 | 10.6 | 738 | 14.418 | 10.8 | 750 | 14.5 | 11.5 | 790 | 14.57 | 12.1 | 842 | 14.64 | 12.7 | 868 | 14.75 | 13.2 | 890 |
| USA | 194.6 | 119.3 | 615 | 196.9 | 121.7 | 618 | 199.1 | 115.4 | 578 | 201.2 | 119.3 | 592 | 203.2 | 128.2 | 630 | 205.4 | 119.3 | 582 | 208.2 | 109.3 | 525 | 211.0 | 120.7 | 570 | 214.0 | 136.5 | 635 |
| USSR | 230.9 | 91.0 | 392 | 233.5 | 96.9 | 415 | 236.0 | 102.2 | 422 | 238.3 | 106.5 | 448 | 240.6 | 110.3 | 458 | 242.8 | 115.9 | 475 | 245.0 | 120.6 | 492 | 248.0 | 126.0 | 502 | 251.2 | 131.0 | 529 |

NOTES:

POP - Population in millions.

PRD - Production in million tons.

PERCAP PRD - Per capita steel production in kg.

SOURCES: (1) Projection 85, Committee of Economic Studies, IISI, Brussels, 1972

(2) Statistical Year Book, UN, New York, Various issues.

(3) IISI Bulletin, January 21, 1974.